



Original Research Article

Correlation of Anthropometry with Incidence of Carpel Tunnel Syndrome of Hand in Dental Surgeons

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Received: 04/05/2015

Revised: 21/07/2015

Accepted: 27/07/2015

ABSTRACT

Introduction: Dentistry is a profession which deals with skillful activity of hand in small workplace as patient mouth. Continuous static posturing can lead to involvement of hand & wrist very often. Carpal tunnel syndrome (CTS) is a commonest musculoskeletal disorder seen in them. Literature has correlated anthropometric dimensions with involvement of CTS in various sports .hence this study aims at checking association of these parameters in dental profession.

Methods: The study group was composed of 260 dental surgeons of whom 250 with positive signs related to CTS were included in the study. The age group between 25 to 40 years was considered. An anthropometre was used for hand anthropometric measurements and through clinical examination along with tests like phalen was done to assess them for CTS. During measurements values for hand with positive clinical signs were obtained. Eight parameters were evaluated. Statistical analyses done using spss 16 and Pearson correlation test was used.

Results: BMI has shown strong association with CTS in institutionalized as well as private dental practitioners irrespective of gender. Wrist ratio has found association with CTS in mainly institutionalized male and private female practitioners.

Conclusion: Anthropometric measurements like Body Mass Index (BMI) and wrist ratio showed strong relation with CTS.

Key words: hand; anthropometry; carpal tunnel syndrome; dentistry

INTRODUCTION & REVIEW OF LITERATURE

Hand is important sensory organ of the body. Good dexterous hand is a prerequisite for various occupations. Dental profession deals with fine functioning of hands in their skillful work. Demand of dental profession is to sustain the hand position for long time without any support to maintain the work going in small work field.

This put them at risk of various hand related problems. Carpal tunnel syndrome is one of the common pathology observed in this profession.

Compression of the median nerve at the wrist, which is called carpal tunnel syndrome (CTS); there is much evidence for the contribution of body mass index (BMI) to the development of CTS. ⁽¹⁻⁴⁾ Some studies have implicated hand anthropometric

measures in the development of CTS. Johnson et al. ⁽⁵⁾ described the association between wrist ratio and CTS emergence. Successive studies have shown similar findings ^(2,4,6,7) three of which have found an association between wrist ratio and the severity of CTS. ^(2,4,7) The study by Boz et al. ⁽²⁾ also revealed shape index and digit index as determinant factors in the development of CTS. Hence this study aims at correlating anthropometric dimensions with incidence of carpal tunnel syndrome in dental profession.

MATERIALS AND METHODS

260 dental surgeons from Mumbai and Navi Mumbai area were involved in study. Study continued for 6 month duration. Ethical clearance and informed consent were done. Subjects with more than 2 years of experience were involved in study. Those with previous history of musculoskeletal trauma were not included in the study. Basic assessment of anthropometric parameters were done along with details related to their job requirement were collected. The participants were asked about age, gender, occupation, handedness, any previous or current general medical condition, pregnancy, cervical radiculopathy, previous trauma to the neck or upper extremities or surgery involving these regions, history of neuropathy, demyelinating disease and thoracic outlet syndrome. A thorough review was made of systems and a physical examination was performed and appropriate laboratory data was obtained for participants with findings that aroused suspicion. Participants with abnormalities in any of the above areas were excluded from the study. Clinical test of phalens were performed on subjects. 250 subjects in our study noted some or the other finding related to CTS on dominant hand. Clinical finding of CTS were assessed using symptom severity scale

of carpal tunnel syndrome. All the subjects in our study were right dominant.

Anthropometric measurements:

Anthropometric parameters were evaluated in subjects with positive clinical finding related to CTS.

7 parameters related with hand dimensions and ratios were evaluated. Hand width, hand length, 3rd digit length, wrist depth were measured with Lafayette Anthropometer (model no: 01291) and body height and weight was noted. The hand length/body height ratio, the shape index which determines hand shape, the digit index which determines grasping capability and palmar length/width ratio which determines palmar type without the digits were also assessed ⁽⁸⁻¹⁰⁾

Palmar length: The palmar length defined as the distance between the midpoint of the distal wrist crease and the midpoint of the proximal digit crease, was calculated according to the formula hand length minus 3rd digit length. Measurements were taken from the palmar side with digits fully stretched touching on a flat, hard surface and the 2nd to 5th digit adducted and the thumb slightly extended. ⁽¹⁰⁾ Hand width, hand length, 3rd digit length and body height were measured with the method stated by Pheasant. ⁽¹¹⁾ The hand length/body height ratio, the shape index which determines hand shape, the digit index which determines grasping capability and palmar length/width ratio which determines palmar type without the digits were also assessed.

Shape index (length-width index, hand index): Hand width x 100/Hand length.

Digit index (phalangeal index): 3rd digit length x 100/hand length.

Palmar length/width ratio: Palmar length/Palmar width (Palmar width = Hand width).

Hand length/height ratio: Hand length/Body height.

Wrist ratio: Antero-posterior diameter / medial-lateral diameter of wrist.

Body weight was measured using a standard scale with light clothing on and

without any footwear. Height was measured with the individual in upright position in front of a wall looking ahead and heels touching one another.

Statistical analysis was done using spss 16 and test used is Pearson correlation test.

RESULTS

Table 1: Demographic data of Age, Body mass index, practicing years, practicing hours and hand indices between different groups.

	VARIABLES	ALL SUBJECTS	MALE	FEMALE
INSTITUTIONAL	AGE	28±1.17	28±1.16	28±1.18
	BMI	22.48±1.87	22.88±1.25	22.21±1.85
	PRACTICING YEARS	5.49±1.46	5.6±1.23	4.89±1.5
	PRACTICING HOURS	8.36±1.86	8.23±1.45	7.51±1.52
PRIVATE	AGE	36.73 ± 4.14	36.73 ± 1.18	36.74 ± 3.14
	BMI	23.97±1.77	23.85±1.25	24.10±1.97
	PRACTICING YEARS	11.19 ± 4.0	11.21±3.4	10.23±3.32
	PRACTICING HOURS	7.96 ± 0.84	8.36±0.57	6.91±0.51

Table 2: Correlation matrix of Anthropometric measurements with CTS.

VARIABLES		CTS CORRELATION (with variables)			
		MALE		FEMALE	
		Institutional (IN)	Private (PP)	Institutional (IN)	Private (PP)
BMI	Pearson Correlation	.483***	.375*	.260*	.495***
	Sig. (2-tailed)	.0003	.005	.021	.0001
	N	51	65	78	56
WRIST RATIO	Pearson Correlation	.263*	.199	.116	.708**
	Sig. (2-tailed)	.063	.114	.312	.005
	N	51	65	78	56
SHAPE INDEX	Pearson Correlation	.235	.096	.035	.129
	Sig. (2-tailed)	.098	.447	.759	.339
	N	51	65	78	56
DIGIT INDEX	Pearson Correlation	.301*	-.121	.146	.100
	Sig. (2-tailed)	.032	.336	.201	.462
	N	51	65	78	56
HAND LENGTH/HEIGHT	Pearson Correlation	.301*	.026	.005	-.222
	Sig. (2-tailed)	.032	.834	.966	.099
	N	51	65	78	56

*Significant correlation *** strong correlation

BMI has shown strong association with CTSQ in institutionalized as well as private dental practitioners irrespective of gender and dominance. Wrist ratio has found association with CTSQ in mainly institutionalized male and private female practitioners on dominant hand.

DISCUSSION

The personal characteristics like BMI, hand length, width, 3rd finger length, wrist width and depth were taken into

considerations for assessing shape index, digit index hand length /height ratio and wrist ratio respectively. These parameters were considered to correlate them as risk factors for Carpal Tunnel Syndrome (CTS). There have been few studies have shown that have specifically studies the correlation between hand anthropometric indices and development of CTS. In a recent study Moghtaderi et al ⁽⁴⁾ revealed that wrist ratio could be an independent risk for CTS development, while the wrist circumference

might have a protective effect. Boz et al. (2) showed that wrist ratio, shape index and digit index were independent risk factors in females, but failed to show statistically any significant difference between groups. In our study it was found that wrist ratio is a determinant of CTS development in female (private practitioners) which is consistent with the results of the previous studies, (2, 6, 7, 12). This could be because of age and increased number of practicing years. We also found it significant in males, institutional males specifically. The role of CTS development is not fully understood but several explanations have been proposed. One of it says that there may be a potential link between wrist ratio and variations in carpal stenosis in the dynamic and static relationship of structures and median nerve abnormalities. (5,7,13) Specific wrist shapes may increase the potential for CTS to develop because an increase in repetitive hand movements, making the subject more susceptible to CTS (13, 14) our study found that there is not much association of digit index and hand length / height ratio as risk factors for females. It showed some association in Institutional male subjects but not others. Also BMI shows strong association with CTS among all the samples. There are number of studies supporting this result. (2,4,6) Proposed mechanism might be increased carpal tunnel fat content in fat people, which in turn causes the hydrostatic pressure to rise (14,15)

CONCLUSION

Anthropometric measurements like Body Mass Index (BMI) for both hands and wrist ratio showed strong relation with CTS.

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How to cite this article: Tejashree D, Gandhi P, Dabholkar A et.al. Correlation of anthropometry with incidence of carpal tunnel syndrome of hand in dental surgeons. *Int J Health Sci Res*. 2015; 5(8):356-360.

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